Level 2 Supervisor Requirements

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Abstract

This note describes the requirements of the Level 2 Supervisor from the standpoint of the components of the TDAQ system with which it must interact. It also discusses the use of the Supervisor application within the common framework which will be developed for DataFlow applications.

1 Document Change Record

Table 1: Document Change Record

Issue	Revision	Date	Reason for Change
0	1	20 April '01	JS
0	2	27 April '01	JS, Second iterion incorporating comments from Data Collection Meeting,23 April

2 Introduction

The Level 2 Supervisor is the interface to the Level 1 system via the RoI Builder. It is responsible for distributing events to the Level 2 farm and effectively managing the processing resources of the farm via a load balancing algorithm. It receives the final decision on an event based on the result of the Level 2 Processing Unit. The decision results are communicated to the DataFlow manager so that accepted events can be further analysed and rejected events can be flushed from the Readout System memory.

2.1 Scope of the software

The Level 2 Supervisor software deals with tasks which are specific to an application which runs within a framework common to other Data Collection applications. The services on which it relies to communicate with other components are addressed elsewhere. These services include message passing, error reporting, run control, information services and configuration.

The specifics issues that the software must address are correct handling of the messages, detection and handling of error conditions, load balancing of Level 2 processing units and performance monitoring.

2.2 Glossary

Data Collection	*The subsystem of the Atlas TDAQ DataFlow system which moves data from the Readout System to the Level 2 Processing units and the Event Filter*
Data Flow Manager	*The component of the Data Collection subsystem which directs the movement of data from the readout system to the Event Filter*
Level 2 Processing Unit	*The component of the Data Collection system which collects detector data from the readout System and forms a decision based on selected algorithms*

Read Out System	The subsystem of the Data Flow system which collects data from the detector Read Out drivers and provides selected events to the Level 2 and event Filter farms.
RoI Builder	The component of the Data Collection subsystem that moves Level 1 results from the Level 1 Read Out Drivers to the Level 2 Supervisor.
Application Framework	The collection of services which are provided to all data Collection applications whose purpose is to provide a bridge to the TDAQ On-line software.

3 General Description

3.1 Perspective

The Level 2 Supervisor interacts with a number of other components of the Data Flow system. These are the RoI Builder, the farm of Level 2 Processing units, the Data Flow Manager and the Readout System. The communication with the user is handled through the Data Collection common application framework.

In order to cope wiht the Level 1 accept rate, a farm of supervisor processors may be necessary.

3.2 General Functionality

The supervisor must be able to receive the Level 1 result form the RoI Builder. In many instances, the RoI Builder may not be available, so the Level 1 result must then be generated from configuration parameters supplied by the user or preloaded from a file wch contains data that is coherent with sata loaded into the Readout system. In cases where the RoI Builder is not used there must be a means provided to trigger the Supervisor from an external source.

The supervisor must have a means to assert back pressure on the source of Level 1 triggers. This mechanism may be different depending on the type of trigger source.

The Level 1 result is sent to a Level 2 processor selected so as to make efficient use of the resources of the Level 2 farm. The Level 2 processing decision must be returned and forwarded to the Data Flow Manager. The case where the Level 2 processor fails to return a decision must be handled in a special way.

The supervisor must be able to use the Level 1 trigger type since the Level 2 processing farm may be partitioned into units which are dedicated to specific triggers.

3.3 General Constraints

The format of the Level 1 result is defined by the Level 1 subsystems and the RoI Builder. The format of the Level 2 decision, and the message forwarded to the Data Flow Manager must be agreed upon by the developers of those components.

To function as an application within a common Data Collection framework, the software must use the APIs provided by the packages of that framework.

4 Specific Requirements

4.1 Functional requirements

UR-1 Level 1 Accept Rate

The Supervisor must be able to handle a Level 1 Accept rate of 100 kHz

UR-2 Level 1 Result Error Handling

The Supervisor shall check for errors flagged in the Level 1 data and take appropriate actio upon detecting such errors

UR-3 Level 1 Result Source

The Level 1 data source shall be selected by the user at configuration time and shall include the choice between RoI Builder, data preloaded from a file coherent with data preloaded into the readout system and data generated internally based on parameters supplied by the user.

UR-4 External Trigger

It shall be possible to trigger the Supervisor externally in cases where the RoI Builder is not used to provide the source of Level 1 results.

U%-5 Back Pressure

The supervisor shall assert back pressure on the Level 1 trigger source when the Level 2 farm event queues are full. When the RoI Builder is the source of Level 1 triggers, the S-Link interface can serve this purpose. When an external trigger source, sucj as a TTC interface, is the trigger source, the supervisor shall have a means to assert a busy condition on the external trigger.

<u>UR-6 Level 2 Decision Request</u>

The Supervisor shall request a Level 2 Decision by selecting a node form the Level 2 Farm and forwarding the Level 1 Result to the selected processor.

<u>UR-7 Level 2 Farm Load Balancing</u>

The Supervisor shall use a load balancing algorithm selected by the user so that various options can be studied. The minimum set of algorithms include round robin and least queued Level 2 processor.

<u>UR-8 Level 2 Processor Timeout</u>

When a Level 2 processor fails to return a Level 2 Result within a specified timeout period, the Supervisor shall force an accept decision on the event and attempt to determine the cause of the timeout.

<u>UR-9 Level 2 Farm Performance Statistics</u>

The Supervisor shall keep statistics on the performance of the Level 2 Farm including the quantities average rate, latency and number of accepted and rejected events.

<u>UR-10 Level 2 Accept Decision Handling</u>

A Level 2 Decision shall be forwarded to the Data Flow Manager

4.2 **Constraint requirements**

<u>UR-11 Level 1 Result Format</u>

The format of the Level 1 result has been defined in the Level 1 / Level 2 Interface document. This format shall be used in the Level 2 system whether the Level 1 source is the RoI Builder, a file or internally generated.

<u>UR-12 RoI Builder Interface</u>

The Supervisor shall support the interface technology used by the RoI Builder to provide the Level 1 result which is currently S-Link.

<u>UR-13 Message Passing Protocol</u>

The Supervisor shall use the message passing protocol defined by the Data Collection common application framework to exchange messages with to Level 2 processors, the Data Flow manager and the readout System.

UR-14 Error and Status Reporting

The Supervisor shall report error conditions, status and debug information using the reporting system provided by the Data Collection common application framework.

UR -15 Configuration

The Supervisor shall obtain cnfiguration parameters from the configuration database service provided by the Data Collection common application framework.

UR-16 Information Service

The Supervisor shall use the information service of the common application framework to publish the statistics which it compiles.